Denial of long-term issues with agriculture on tropical peatlands will have devastating consequences

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List of Authors:

Lahiru S. Wijedasa[1,2,3*], Jyrki Jauhiainen[4], Mari Könönen[4], Maija Lampela[4], Harri Vasander[4], Marie-Claire LeBlanc[5], Stephanie Evers[6,7,8], Thomas E.L. Smith[9], Catherine M. Yule[7,10], Helena Varkkey[7,11], Massimo Lupascu[12], Faizal Parish[13], Ian Singleton[14], Gopalasamy R. Clements[3,6,10,15,16], Sheema Abdul Aziz[3,6,16], Mark E. Harrison[17,18], Susan Cheyne[17], Gusti Z. Anshari[19], Erik Meijaard[20,21], Jenny E. Goldstein[22], Susan Waldron[23], Kristell Hergoualc'h[24], René Dommain[25], Steve Frolking[26], Christopher D. Evans[27], Mary Rose C. Posa[1], Paul H. Glaser[28], Nyoman Suryadiputra[29], Reza Lubis[29], Truly Santika[21], Rory Padfield[7,30,31], Sofyan Kurnianto[24,32], Panut Hadisiswoyo[33], Teck Wyn Lim[34], Susan E. Page[18], Vincent Gauci[35], Peter J. van der Meer[36], Helen Buckland[37], Fabien Garnier[37], Marshall K. Samuel[6,7,40,41], Liza Nuriati Lim Kim Choo[40], Patrick O'Reilly[7,42,43], Matthew Warren[44], Surin Suksuwan[45], Elham Sumarga[46], Anuj Jain[2,47], William F. Laurance[48], John Couwenberg[49], Hans Joosten[49], Ronald Vernimmen[50], Aljosja Hooijer[50], Chris Malins[51], Mark A. Cochrane[52], Balu Perumal[53], Florian Siegert[54,55], Kelvin S.-H. Peh[56,57], Louis-Pierre Comeau[58], Louis Verchot[59], Charles F. Harvey[60, 61], Alex Cobb[60], Zeehan Jaafar[1,61], Henk Wösten[62], Solichin Manuri[63], Moritz Müller[64], Wim Giesen[65], Jacob Phelps[66], Ding Li Yong[63,67], Marcel Silvius[68], Béatrice M. M. Wedeux[69], Alison Hoyt[60,61], Mitsuru Osaki[70], Hirano Takashi[70], Hidenori Takahashi[71], Takashi S. Kohyama[70], Akira Haraguchi[72], Nunung P. Nugroho[73],

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David A. Coomes[69], Le Phat Quoi[74], Alue Dohong[75], Haris Gunawan[75], David L.A. Gaveau[24], Andreas Langner[76], Felix K. S. Lim[77], David P. Edwards[77], Xingli Giam[78], Guido van der Werf [79], Rachel Carmenta[24], Caspar C. Verwer[80], Luke Gibson[81], Laure Grandois[82], Laura Linda Bozena Graham[83], Jhanson Regalino[83], Serge A. Wich[8,84], Jack Rieley[85], Nicholas Kettridge[86], Chloe Brown[85], Romain Pirard[24], Sam Moore[87], B. Ripoll Capilla[17], Uwe Ballhorn[55], Hua Chew Ho[88], Agata Hoscilo[89], Sandra Lohberger[55], Theodore A. Evans[90], Nina Yulianti[91], Grace Blackham[92], Onrizal[93], Simon Husson[17], Daniel Murdiyarso[24,94], Sunita Pangala[35], Lydia E.S. Cole[95], Luca Tacconi[96], Hendrik Segah[97], Prayoto Tonoto[98], Janice S.H. Lee[99], Gerald Schmilewski[100], Stephan Wulffraat[101], Erianto Indra Putra[52,102], Megan E. Cattau[103], R.S. Clymo[104], Ross Morrison[105], Aazani Mujahid[106], Jukka Miettinen[107], Soo Chin Liew[107], Samu Valpola[108], David Wilson[109], Laura D'Arcy[17], Michiel Gerding[100], Siti Sundari[110], Sara A. Thornton[17,18], Barbara Kalisz[111], Stephen J. Chapman[112], Ahmad Suhaizi Mat Su[113], Imam Basuki[24,32], Masayuki Itoh[114], Carl Traeholt[115], Sean Sloan[48], Alexander K. Sayok[106] & Roxane Andersen[115*].

Institute of laboratory origin:

[1]Department of Biological Sciences, National University of Singapore, Singapore.

[2]ConservationLinks, 433 Clementi Avenue 3, #01-258, Singapore 120433.

[3]Rimba, Malaysia, 4 Jalan 1/9D Bandar Baru Bangi, Selangor, MY 43650, Malaysia.

[4]University of Helsinki, Finland.

[5]Université Laval, Québec, Canada.

[6]School of Biosciences, University of Nottingham Malaysia Campus, Selangor, Malaysia.

[7]Tropical Catchment Research Initiative (TROCARI), Kuala Lumpur, Malaysia.

[8]School of Natural Sciences & Psychology, Liverpool John Moores University, United Kingdom.

[9]Department of Geography, King's College London, United Kingdom.

[10]Monash University Malaysia, Malaysia.

[11]Department of International & Strategic Studies and Asia-Europe Institute, University of Malaya, Malaysia.

[12]Department of Geography, National University of Singapore, Singapore.

[13]Global Environment Centre, Malaysia.

[14]Sumatran Orangutan Conservation Programme, Indonesia.

[15]Kenyir Research Institute, Universiti Malaysia Terengganu, Malaysia.

[16]Département Écologie et Gestion de la Biodiversité, Muséum National d'Histoire Naturelle, France.

[17]Borneo Nature Foundation, Kalimantan, Indonesia.

[18]University of Leicester, United Kingdom.

[19]Centre for Wetlands, People and Biodiverstiy, Tanjungpura University, Western Kalimantan, Indonesia.

[20]Borneo Futures, Jakarta, Indonesia.

[21]School of Biological Sciences, University of Queensland, Brisbane, Australia.

[22]Cornell University, USA.

[23]University of Glasgow, United Kingdom.

[24]Center for International Forestry Research (CIFOR), Indonesia & Peru.

[25]Smithsonian Institution, National Museum of Natural History, Washington, DC, USA.

[26]Institude for the Study of Earth, Oceans and Space, University of New Hampshire, USA.

[27]Centre for Ecology and Hydrology, Bangor, United Kingdom.

[28]Department of Earth Sciences, University of Minnesota, Minneapolis, USA.

[29]Wetlands International −Indonesia Programme, Bogor, Indonesia.

[30]Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia.

[31]Department of Social Sciences, Oxford Brookes University, United Kingdom.

[32]Departement of Fisheries and Wildlife, Oregon State University, USA.

[33]Orangutan Information Centre, Sumatra, Indonesia.

[34]Resource Stewardship Consultants Sdn Bhd, Malaysia.
[35]School of Environment, Earth and Ecosystem Sciences, The Open University, United Kingdom.
[36]Van Hall Larenstein University of Applied Sciences, The Netherlands.
[37]Sumatran Orangutan Society, London, United Kingdom.
[40]Climate Change Programme, Malaysian Agricultural Research and Development Institute (MARDI), Malaysia.
[41]Global Research Alliance (GRA), USDA-FAS, Washington State University, Pullman, USA.
[42]Crops for the Future, Semenyih, Malaysia.
[43]School of Politics, History and International Relations, University of Nottingham Malaysia Campus, Semenyih, Malaysia.
[44]USDA Forest Service, Northern Research Station, USA.
[45]Proforest, Kuala Lumpur, Malaysia.
[46]School of Life Sciences and Technology, Institut Teknologi Bandung, Indonesia.
[47]BirdLife International, Cambridge, United Kingdom.
[48]Centre for Tropical Environmental and Sustainability Science (TESS) & College of Science and Engineering, James Cook University, Cairns, Queensland, Australia.
[49]Institute of Botany and Landscape Ecology, University of Greifswald, Greifswald, Germany.
[50]Deltares, Boussinesqweg 1, 2629 HV, Delft, Netherlands.
[51]Cerulogy, London, United Kingdom.
[52]Geospatial Sciences Center of Excellence, South Dakota State University, USA.
[53]Malaysian Nature Society, Kuala Lumpur, Malaysia.
[54]GeoBio Center, Ludwig-Maximilians-University, Germany.
[55]RSS Remote Sensing Solutions GmbH, Baierbrunn, Germany.
[56]Centre for Biological Sciences, University of Southampton, United Kingdom.
[57]Conservation Science Group, Department of Zoology, University of Cambridge, United Kingdom.

[58]Department of Geography and Resource Management, Chinese University of Hong Kong, Hong Kong, China.

[59]International Centre for Tropical Agriculture (CIAT), Cali, Colombia.

[60]Singapore-MIT Alliance for Research and Technology, Singapore, Singapore.

[61]Massachusetts Institute of Technology, Parsons Laboratory, Cambridge, Massachusetts, USA.

[61]Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA.

[62]Wageningen University and Research, Wageningen, The Netherlands.

[63]Fenner School of Environment and Society, Australian National University, Australia.

[64]Swinburne University of Technology Sarawak Campus, Kuching, Sarawak, Malaysia.

[65]Euroconsult Mott MacDonald, Arnhem, The Netherlands.

[66]Lancaster Environment Centre, Lancaster University, Lancaster, United Kingdom.

[67]Southeast Asian Biodiversity Society, Singapore.

[68]Wetlands International, Wageningen, The Netherlands.

[69]Department of Plant Sciences, University of Cambridge, United-Kingdom.

[70]Hokkaido University, Japan.

[71]NPO Hokkaido Institute of Hydro-climate, Japan.

[72]Kyushu Institute of Technology, Japan.

[73]Research and Development Institute on Watershed Management Technology, Research, Development and Innovation Agency, Ministry of Environment and Forestry; Indonesia.

[74]Institute for Environment and Natural Resources, National University at HCM City, Vietnam.

[75]Peatland Restoration Agency (BRG), Indonesia.

[76]Joint Research Centre of the European Commission, Directorate D – Sustainable Resources - Bio-Economy Unit, Italy.

[77]Department of Animal and Plant Sciences, University of Sheffield, United Kingdom.

[78]School of Aquatic and Fishery Sciences, University of Washington, Seattle, USA.

[79]Faculty of Earth and Life Sciences, University Amsterdam, The Netherlands.

[80]International Union for Conservation of Nature (IUCN), National Committee of The Netherlands.

[81]School of Biological Sciences, University of Hong Kong, Hong Kong, China.

[82]Laboratoire écologie fonctionnelle et environnement, Université de Toulouse, CNRS, INPT, UPS, France.

[83]Borneo Orangutan Survival Foundation (BOSF), Indonesia.

[84]Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, The Netherlands.

[85]School of Geography, The University of Nottingham, United Kingdom.

[86]School of Geography, Earth and Environmental Science, University of Birmingham, United Kingdom.

[87]Environmental Change Institute, School of Geography and the Environment, University of Oxford, United Kingdom.

[88]Nature Society (Singapore), Singapore.

[89]Remote Sensing Centre, Institute of Geodesy and Cartography, Modzelewskiego 27, Warsaw, Poland.

[90]School of Animal Biology, University of Western Australia, Perth, WA, 6009, Australia.

[91]University of Palangka Raya, Central Kalimantan, Indonesia.

[92]Wildfowl and Wetlands Trust, United Kingdom.

[93]Tropical Forest Ecology and Conservation Division, Faculty of Forestry, Universitas Sumatera Utara, Medan, Indonesia.

[94]Department of Geophysics and Meteorology, Bogor Agricultural University, Bogor 16680, Indonesia.

[95]Oxford Long-term Ecology Laboratory, Department of Zoology, University of Oxford, Oxford, United Kingdom.

[96]Crawford School of Public Policy, The Australian National University, Australia.

[97]University of Palangka Raya (UPR), Central Kalimantan, Indonesia.

[98]Graduate School for International Development and Cooperation, Hiroshima University, Hiroshima, Japan.

[99]Asian School of the Environment, Nanyang Technological University, Singapore.

[100]International Peatland Society, Jyväskylä, Finland.

[101]World Wide Fund for Nature, Jakarta, Indonesia.

[102]Faculty of Forestry, Bogor Agricultural University, Bogor, Indonesia.

[103]University of Colorado, Boulder, USA.

[104]Queen Mary University of London, London, United Kingdom.

[105]Land Surface Flux Measurements Group, Centre for Ecology and Hydrology, Wallingford, United Kingdom.

[106]Department of Aquatic Science, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, Sarawak, Malaysia.

[107]Centre for Remote Imaging, Sensing and Processing, National University of Singapore, Singapore.

[108]Geological Survey of Finland, Kokkola, Finland.

[109]Earthy Matters Environmental Consultants, Glenvar, Letterkenny, Donegal, Ireland.

[110]Research Center for Biology, Indonesian Institute of Sciences (LIPI), Bogor, Indonesia.

[111]Department of Soil Science and Land Reclamation, Faculty of Environment and Agriculture, University of Warmia and Mazury in Olsztyn, Poland.

[112]Ecological Sciences Group, The James Hutton Institute, Craigiebuckler, Aberdeen, Scotland, United Kingdom.

[113]Department of Agriculture Technology, Faculty of Agriculture, Universiti Putra Malaysia, Malaysia.

[114]Centre for Southeast Asian Studies, Kyoto University, Kyoto, Japan.

[115]Southeast Asia Program, Research and Conservation Division, Copenhagen Zoo, Denmark.

[116]Institute of Biodiversity and Environmental Conservation, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, Sarawak, Malaysia.

[115]Environmental Research Institute, University of Highlands and Islands, United Kingdom.

Corresponding authors:

lahirux@gmail.com & Roxane.Andersen@uhi.ac.uk

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Letter to the Editor

Main Text:

The first International Peat Congress (IPC) held in the tropics - in Kuching (Malaysia) - brought together over 1000 international peatland scientists and industrial partners from across the world ("International Peat Congress with over 1000 participants!," 2016). The congress covered all aspects of peatland ecosystems and their management, with a strong focus on the environmental, societal and economic challenges associated with contemporary large-scale agricultural conversion of tropical peat

However, recent encouraging developments towards better management of tropical peatlands have been undermined by misleading newspaper headlines and statements first published during the conference. Articles in leading regional newspapers ("Oil palm planting on peat soil handled well, says Uggah," 2016; Cheng & Sibon, 2016; Nurbianto, 2016a, 2016b; Wong, 2016) widely read across the region, portrayed a general consensus, in summary of the conference, that current agricultural practices in peatland areas, such as oil palm plantations, do not have a negative impact on the environment. This view is not shared by many scientists, or supported by the weight of evidence that business-as-usual management is not sustainable for tropical peatland agriculture.

Peer-reviewed scientific studies published over the last 19 years, as reflected in the Intergovernmental Panel on Climate Change (IPCC) Wetland Supplement on greenhouse gas inventories, affirms that drained tropical peatlands lose considerable amounts of carbon at high rates (Drösler *et al.*, 2014). Tropical peat swamp forests have sequestered carbon for millennia, storing a globally significant reservoir below ground in the peat (Page *et al.*, 2011; Dommain *et al.*, 2014). However, contemporary agriculture techniques on peatlands heavily impact this system through land clearance, drainage and fertilization, a process that too often involves fire. Along with biodiversity losses driven by deforestation (Koh *et al.*, 2011; Posa *et al.*, 2011; Giam *et al.*, 2012), the carbon stored in drained peatlands is rapidly lost through oxidation, dissolution and fire (Couwenberg *et al.*, 2009; Hirano *et al.*, 2012; Ramdani & Hino, 2013; Schrier-Uijl *et al.*, 2013; Carlson *et al.*, 2015; Warren *et al.*, 2016). Tropical peat fires are a major contributor to global greenhouse gas emissions and produce transboundary haze causing significant impacts on human health, regional economies and ecosystems (Page *et al.*, 2002; Marlier *et al.*, 2012; Jaafar & Loh, 2014; Chisholm *et al.*, 2016; Huijnen *et al.*, 2016; Stockwell *et al.*, 2016). With future El-Niño events predicted to increase in frequency and severity (Cai *et al.*, 2014) and with fire prevalence now decoupled from drought years

(Gaveau *et al.*, 2014), future large scale fire and haze events are imminent given the extensive areas of now drained fire prone drained peatlands (Kettridge *et al.*, 2015; Turetsky *et al.*, 2015; Page & Hooijer, 2016).

In reality, just how much of the estimated 69 gigatonnes of carbon (Page *et al.*, 2011) stored in Southeast Asian tropical peatlands is being lost due to agricultural operations under the current management regime is still uncertain. Of great concern is that none of the agricultural management methods applied to date have been shown to prevent the loss of peat and the associated subsidence of the peatland surface following drainage (Wösten *et al.*, 1997; Melling *et al.*, 2008; Hooijer *et al.*, 2012; Evers *et al.*, 2016). Recent projections suggest that large areas of currently drained coastal peatlands will become un-drainable, and progressively be subjected to longer periods of inundation by river and ultimately sea water (Hooijer *et al.*, 2015a, 2015b; Sumarga *et al.*, 2016). With growing risk of saltwater intrusion, agriculture in these coastal lands will become increasingly untenable, calling into question the very notion of "long-term sustainability of tropical peatland agriculture".

A more accurate view of drained peatland agriculture is that of an extractive industry, in which a finite resource (the peat) is 'mined' to produce food, fibre and fuel, driven by global demand. In developing countries with growing populations, there are strong socio-economic arguments for exploiting this resource to support local livelihoods and broader economic development (Mizuno *et al.*, 2016). However, an acceptance that on-going peat loss is inevitable under this scenario. Science-based measures towards improved management, including limitations on the extent of plantation development, can be used to minimise the rate of this peat loss (President of Indonesia, 2011). Such an evidence-based position, supported with data and necessary legal instruments are needed for sustainable futures. The scientifically unfounded belief that drained peatland agriculture can be made 'sustainable', and peat loss can be halted, via unproven methods such as peat compaction debilitates the effort to find sustainable possibilities. To a large extent, the issues surrounding unsustainable peatland management have now been recognized by sections of industry (Wilmar, 2013; APP, 2014; Cargill Inc., 2014; Mondelēz International, 2014; Sime Darby Plantation, 2014; APRIL, 2015; Olam International, 2015), government (President of Indonesia, 2014, 2016; Mongabay, 2015; Mongabay Haze Beat, 2015; Hermansyah, 2016) and consumers (Wijedasa *et al.*, 2015). In recognition of the constraints and risks of peatland development, many large and experienced oil palm and pulpwood companies have halted further development on peat and introduced rigorous management requirements for existing peatland plantations(Lim *et*

al., 2012). However, the denial of the empirical basis calling for improved peatland management remains persistent in influential policy spaces, as illustrated by the articles reporting on the conference ("Oil palm planting on peat soil handled well, says Uggah," 2016; Cheng & Sibon, 2016; Nurbianto, 2016a, 2016b).

The search for more responsible tropical peatland agriculture techniques includes promising recent initiatives to develop methods to cultivate crops on peat under wet conditions (Giesen, 2015; Dommain *et al.*, 2016; Mizuno *et al.*, 2016). While a truly sustainable peatland agriculture method does not yet exist, the scientific community and industry are collaborating in the search for solutions(International Peat Society, 2016), and for interim measures to mitigate ongoing rates of peat loss under existing plantations. Failing to recognize the devastating consequences of the current land use practices on peat soils and failing to work together to address them could mean that the next generation will have to deal with an irreversibly altered, dysfunctional landscape where neither environment nor society, globally or locally, will be winners.

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